

PHOTO 5. Woodland Clearing

Project construction will require some woodland for rights-of-way. Portions of these rights-of-way will be lost to wildlife habitat production, while much of the area will be suitable for revegetation. Project-induced land clearing will range from 2,200 acres with Plan C-10,000 to 48,000 acres with Plan C-25,000. Plan H-15,000 will induce clearing on approximately 700 acres, but would preserve a total of 30,000 acres of bottom-land hardwoods.

#### Seasonal Flooding

The seasonal flooding of backwater areas provides valuable feeding and nesting areas for resident and migratory waterfowl. The flooding which generally occurs during the dormant season can increase radial tree growth and increase production of nuts and acorns of most bottom-land hardwoods, which are a food

source for various species of wildlife. Seasonal flooding periodically increases aquatic habitat and spawning areas and allows for utilization of terrestrial food items by sport and commercial species.

In general, the seasonal flooding which occurs in the project area benefits fish, wildlife, and waterfowl and contributes to the unique character of the area. While all the structural plans for flood protection reduce seasonal flooding, the larger capacity pumps have the greatest detrimental effect on fish and wildlife resources due to the reduction in seasonal flooding.

#### Water Quality

The existing water quality in the project area is generally poor, except in Eagle Lake, which is protected by the Muddy Bayou control structure. None of the plans would significantly affect water quality within the area. Existing streams have little or no woody type vegetation in or adjacent to them. Water quality in the area will continue to deteriorate as agricultural activity increases and additional lands are cleared.

#### ENERGY ANALYSIS

Average annual energy use ranged from 4.7 million kWh with Plan H - 15,000 to 19.7 million kWh with Plan C - 25,000 as shown in Table 5. Based on current energy rates in the project area, annual energy costs would be \$367,000 and \$1,227,000 for these plans. Anticipated rate increases would increase these costs by over 300 percent over the next 10 years. The no-action plan would have no impact on energy consumption.

### COMPARISON OF DETAILED PLANS

Table 5 compares each of the plans in the final array with respect to nine parameters. These parameters formed the basis for the designation of the NED, EQ, as well as the recommended plan.

#### RATIONALE FOR DESIGNATION OF NED PLAN

The NED (National Economic Development) plan addresses the planning objectives in the way which maximizes net economic benefits. With this in mind, the alternative plans were ranked based on excess benefits over costs. Plan C-25,000 would provide the greatest net benefits over cost and is designated the NED plan. Excess benefits over cost provided by Plan C-25,000 would amount to \$18,661,000, resulting in a benefit-cost ratio of 3.0. No mitigation plan was developed for this alternative; however, it is estimated that approximately 7,500 acres of bottom-land hardwoods acquired in land use easements would be required to implement this plan.

TABLE 5  
COMPARISON OF DETAILED PLANS  
YAZOO AREA PUMP STUDY  
(2-1/2 Percent Interest Rate)

Plans/Parameters	First Costs (\$000)	Excess Benefits (\$000)	Benefit-Cost Ratio	Reduction in Damages (%)	Area Protected from 100-Year Flood (acres)	Structures Protected from 100-Year Flood	Energy Consumption (Million kWh)	Induced Clearing (acres)	Net Fish and Wildlife Losses (\$000)
C - 10,000	85,800	10,347	3.8	45	148,600	430	6.3	2,200	58
C - 15,000	125,500	13,627	3.4	60	204,070	698	12.0	3,200	83
C - 17,500	147,200	15,441	3.3	68	241,330	822	14.9	3,700	95
C - 20,000	172,600	16,970	3.2	76	263,470	890	16.5	4,300	107
C - 25,000 <sup>a/</sup>	210,900	18,661	3.0	86	348,240	989	19.7	4,800	120
H - 15,000 <sup>b/</sup>	162,800	4,662	1.8	89	205,590	688	4.7	700	-253

<sup>a/</sup> NED plan.

<sup>b/</sup> EQ plan.

## RATIONALE FOR DESIGNATION OF EQ PLAN

The EQ plan addresses the planning objectives in the way which emphasizes esthetic, ecological, and cultural contributions. Beneficial EQ contributions are made by preserving, maintaining, restoring, or enhancing the significant cultural and natural environmental attributes of the project area. The alternative plans for the Yazoo Area were evaluated and ranked using environmental parameters such as induced land clearing, bottom-land hardwoods, and water quality.

Plan H-15,000 is considered the best plan from an environmental standpoint. This plan includes the purchase of approximately 30,000 acres of bottom-land hardwoods in tracts of 100 acres and larger to be developed for the purpose of preserving bottom-land hardwoods and improving fish and wildlife resources. Plan H makes a net positive annual contribution of 554,722 habitat units to the EQ account and is designated the EQ plan. Plan H also provides \$252,700 in net fish and wildlife benefits.

## RATIONALE FOR DESIGNATION OF RECOMMENDED PLAN

The six structural alternatives considered vary in size and acres protected. The item of highest value to the NED plan is flood protection for homes, improvements, and agricultural lands. The item of highest value to the EQ plan is protection of woodlands and water quality. The plan designated as the NED plan protects the largest area from flooding, while the designated EQ plan protects the greatest amount of bottom-land hardwoods, fish and wildlife resources, and water quality.

In determining the best plan, attention was focused on the various parameters shown in Table 5. As indicated, Plan H-15,000 uses the least amount of energy and provides the greatest protection to the environment. Plan C-25,000 provides the maximum benefits over cost and protects the largest amount of property.

The problem in selecting the best plan is that none of these categories can be compared directly to another. Excess benefits and fish and wildlife losses are both expressed in dollars; however, economic dollars are not necessarily equivalent to environmental dollars. Since each of the pump sizes was economically sound, a plan was selected which used less energy and was less damaging to the environment. After considering all trade-offs and forgoing benefits in some areas to reduce impacts in other areas, the 17,500-cfs pump

was selected as the best pump plan. This plan, to a large degree, represents a plan which is about halfway between the best and worst conditions as far as energy losses and environmental losses are concerned. It also provides good flood protection, preventing about 68 percent of the average annual damages.

Based on the flood control needs of the residents of the Yazoo Area as well as environmental and energy considerations, Plan C with a pumping capacity of 17,500 cubic feet per second offers the best balance of economic, environmental, social, regional, and engineering factors and is designated as the recommended pump plan. The total cost is \$147,200,000. The total estimated average annual benefits are \$22,072,000.

In addition to being evaluated at the 2-1/2 percent interest rate, each of the alternatives presented in the final array was also evaluated at the current 7-5/8 percent interest rate (Table 6). Evaluation of these plans at the current rate shows that Plan C-17,500 would provide the highest excess benefits over cost, which supports its designation as the recommended pump plan. Excess benefits for the recommended pump plan are \$4,689,000 at current interest rate, producing a benefit-cost ratio of 1.3. Plan H-15,000 is not economically justified when evaluated at a 7-5/8 percent interest rate.

Table 7 presents a summary comparison of the recommended pump plan, the NED plan, the EQ plan, and the no-action plan. The recommended plan as presented in Table 7 includes 6,500 acres of land use easements for mitigation purposes. A detailed description of the mitigation plan is given below.

#### RATIONALE FOR SELECTION OF MITIGATION PLAN

Throughout the study, close coordination with FWS has been maintained to ensure proper consideration of fish and wildlife resources of the project area and to assist in developing the mitigation requirements.

There will be some unavoidable project-induced losses to fish and wildlife resources, due to project-induced clearing and reduction in seasonal flooding on both wooded and agricultural lands. An evaluation of man-day participation in various fish and wildlife-oriented recreational activities under with- and without-project conditions indicated that the recommended plan would result in reductions in annual man-day use.

Project environmental impacts were also evaluated using the nonmonetary portion of the HEP currently utilized by FWS. This evaluation is based on future land use changes, both with and without the project, and estimated effects of these land use changes on habitat unit values.

TABLE 6  
BENEFIT-COST DATA FOR FINAL PLANS

Plan	First Cost	Annual Benefits	Annual Cost	Excess Benefits Over Costs	Benefit- Cost Ratio
	(\$000)	(\$000)	(\$000)	(\$000)	
2-1/2 Percent Interest Rate					
C - 10,000	85,800	14,107	3,760	10,347	3.8
C - 15,000	125,500	19,247	5,620	13,627	3.4
C - 17,500 <u>a/</u>	147,200	22,072	6,631	15,441	3.3
C - 20,000	172,600	24,661	7,691	16,970	3.2
C - 25,000 <u>b/</u>	210,900	28,001	9,340	18,661	3.0
H - 15,000 <u>c/</u>	162,800	10,589	6,197	4,662	1.8
7-5/8 Percent Interest Rate					
C - 10,000	85,800	12,489	8,537	3,952	1.5
C - 15,000	125,500	17,048	12,608	4,440	1.4
C - 17,500 <u>a/</u>	147,200	19,516	14,827	4,689	1.3
C - 20,000	172,600	21,789	17,301	4,488	1.3
C - 25,000 <u>b/</u>	210,900	24,736	21,083	3,653	1.2
H - 15,000 <u>c/</u>	162,800	9,696	14,874	-5,178	0.7

a/ Recommended plan.  
b/ NED plan.  
c/ EQ plan.

TABLE 7  
SUMMARY COMPARISON OF FINAL ALTERNATIVE PLANS

Item	Conditions/Objectives	NED Plan (Plan C) : 25,000-cfs Pump	Recommended Plan (Plan C) : 17,500-cfs Pump with Mitigation	EQ Plan (Plan H)	No-Action
<b>A. Plan Description</b>					
	A major flood hazard exists in the project area. 539,000 acres of land within the project area are subject to flooding from a 100-year flood. Approximately 165,000 total acres are flooded resulting in \$3,888,000 damages annually. Project area has persistent and substantial unemployment and underemployment. Valuable natural resource area with 141,000 acres of bottom-land hardwood forest.	The major feature of this plan is a pumping station located in the lower ponding area just west of the Steele Bayou drainage structure. Pumping would begin at 80 feet, NGVD, except during the period 1 December-1 March when pumping would begin at 85 feet, NGVD. Pumping capacity is 25,000 cubic feet per second.	This plan is the same as the NED plan. However, it would have a pumping capacity of 17,500 cubic feet per second.	This plan would include one pumping station in the lower ponding area. Pumping capacity is 15,000 cubic feet per second. Pumping would be initiated when interior backwater stages reach 85 feet, NGVD. Smaller inlet and outlet channels would be required for this alternative than for the NED or recommended plan. 30,000 acres of bottom-land hardwoods will be purchased for environmental purposes.	The no-action alternative must consider as acceptable all damages which occur in the absence of a project, and must also consider that present trends of development could continue, thereby increasing flood damages to \$8,824,000 annually by the year 2039. However, continued flood problems will act as a deterrent to increased agricultural and related development.
<b>B. Impact Assessment Accounts</b>					
<b>(1) National Economic Development (NED)</b>					
	Reduction of flood hazard in the project area.	Flooding would be reduced by 109,700 total acres annually, providing \$28,001,000 in primary benefits annually and reducing flood damages by 86 percent.	Flooding would be reduced by 92,600 total acres annually, providing \$21,346,000 in primary benefits annually and reducing flood damages by 68 percent.	Flooding would be reduced by 50,000 total acres annually, providing \$10,859,000 in primary benefits annually and reducing flood damages by 35 percent.	No protection provided.
<b>(2) Environmental Quality (EQ)</b>					
	Preservation, protection, and enhancement of area's natural resources.	Plan would have an adverse effect on the area's natural resources. Reduction in flooding would damage habitat and result in more land clearing, causing a loss of bottom-land hardwoods. 4,800 acres of bottom-land hardwoods would be cleared for crop production.	Plan would have an adverse effect on the area's natural resources. Reduction in flooding would damage habitat and result in more land clearing, causing a loss of bottom-land hardwoods. 1,200 acres of bottom-land hardwoods would be cleared for crop production without mitigation. Mitigation will preserve 6,500 acres of bottom-land hardwoods.	Plan would have the least adverse effect on the area's natural resources. Only 500 acres of bottom-land hardwoods would be cleared. To help preserve the wildlife habitat, 30,000 acres of bottom-land hardwoods would be purchased.	With no action taken, bottom-land hardwoods will be cleared and put in agricultural crop production to the extent possible.

TABLE 7 (Cont)

Item	Conditions/Objectives	NED Plan (Plan C) : 25,000-cfs Pump	Recommended Plan (Plan C) : 17,500-cfs Pump with Mitigation	EQ Plan (Plan H)	No-Action
(3) Other Social Effects (OSE)	Improvements in community cohesion by reduction of threat of flooding (security of life, health, and safety), reduction in flood damages, increased income for area residents, reduction of unemployment, etc.	The plan will strengthen the community cohesion over the long run due to the security and development potentials provided by the project.	Same as NED plan.	Same as NED plan.	The community cohesion will be weakened due to the uncertainty and threat of flooding.
(4) Regional Economic Development (RED)	Improvements in regional growth and development with improvements in income, employment, etc.	Property values throughout the project area will increase due to the flood protection provided. Induced land clearing will increase agricultural output and agribusiness activities which generate additional tax revenue.	Same as NED plan.	Same as NED plan.	Land clearing will continue.
<b>C. Plan Evaluation</b>					
(1) Contributions to Planning Objectives					
(a) Reduce flood damages due to infiltration ponding of floodwaters within the Yazoo area to permit optimum agricultural development.		86 percent reduction	68 percent reduction	35 percent reduction	None
(b) Preserve existing bottom-land hardwoods in the project area.		Yes (by mitigation).	Yes	Yes	a/ Yes
(c) Preserve and increase fish and wildlife habitat in the project area.		No	For some species.	Yes	Preservation only.



TABLE 7 (Cont)

Item	Conditions/Objectives	NED Plan (Plan C) : 25,000-cfs Pump	Recommended Plan (Plan C) : 17,500-cfs Pump with Mitigation	EO Plan (Plan H)	No-Action
(d) Preserve existing wetlands within the study area.		No	Yes	Yes	a/ Yes
(2) Net impacts b/					
(a) NED Excess Benefits over Costs		\$18,661,000	\$14,713,000	\$4,662,000	N/A
(b) EQ	Adverse impact on natural resources resulting in expected loss of 4,800 acres of valuable bottom-land hardwoods.		Adverse impact on natural resources resulting in expected loss of 1,200 acres of valuable bottom-land hardwoods.	Purchase of 30,000 acres of bottom-land hardwoods would more than offset expected hardwood losses.	Land clearing of bottom-land hardwoods is expected to continue.
(c) OSE	Provides 86 percent reduction in flood damages. Income of area residents will increase.		Provides 68 percent reduction in flood damages. Income of area residents will increase.	Provides 35 percent reduction in flood damages. Income of area residents will increase.	Potential flooding remains and the uncertainty will have an adverse effect on community cohesion.
(d) RED	\$18,661,000	\$14,713,000	\$4,662,000	N/A	
(3) Plan Evaluation					
(a) Acceptability	Acceptable to all but the environmental interests.	Acceptable to both environmentalists and local public.	Most acceptable to the environmentalists and least acceptable to the local public.	Unacceptable.	
(b) Completeness	Depends upon local assurances.	Same as for NED plan.	Same as for NED plan.	N/A	
(c) Effectiveness	Achieves most NED objectives and some EQ objectives.	Achieves most NED objectives and some EQ objectives.	Achieves some NED objectives and some EQ objectives.	Uneffective.	
(d) Efficiency	A feasible plan to achieve NED objectives.	A feasible plan to achieve NED objectives and some EQ objectives.	Meets some EQ objectives but is not a feasible NED plan.	N/A	
(e) Certainty	Most NED objectives addressed by this plan would be attained.	Both NED and some EQ objectives addressed by this plan would be attained.	Some EQ and NED objectives addressed by this plan would be attained.	No certainty that bottom-land hardwoods or existing wetlands would be preserved.	

TABLE 7 (Cont)

Item	Conditions/Objectives	NED Plan (Plan C) : 25,000-cfs Pump	Recommended Plan (Plan C) : 17,500-cfs Pump with Mitigation	EQ Plan (Plan H)	No-Action
(f) Geographic Scope					
	Encompasses the total project area where development exists or can reasonably be expected to exist in the future.		Same as NED plan.	Same as NED plan.	Same as NED plan.
(g) NED Benefit-Cost Ratio		3.0	3.2	1.8	N/A
(h) Reversibility	Possible but highly improbable.		Same as NED plan.	Same as NED plan.	N/A
(i) Stability	Stable	Stable	Stable	Stable	Remaining flood hazard would reduce the range of alternative features and create pressure that would make conditions unstable.
(4) Rankings of Play Contributions					
(a) NED	1	2	3	4	
(b) EQ	4	3	1	2	
(c) OSE	2	1	3	4	
(d) RED	2	1	3	4	
(e) Total	9	7	10	14	
D. Implementation Responsibility	The Federal government would have the responsibility for the cost of construction as well as operation and maintenance for the project. The local sponsoring agencies responsible for minor maintenance of the inlet and outlet channel.	Same as NED plan.	Same as NED plan.	Same as NED plan.	N/A

a/ Except for destruction due to future encroachment and development.

b/ Measured from without condition.

c/ Ranking is from 1 to 4 with 1 being the best.

In view of the losses of bottom-land hardwoods and fish and wildlife resources, and the nature-oriented educational and recreational opportunities these resources provide, several plans to mitigate the overall environmental loss were formulated and evaluated.

These plans included structural measures to offset the fishery loss, wildlife development on existing Federally owned lands, acquisition and development of underdeveloped woodlands, acquisition, reforestation, and management of marginal cleared lands, fee simple acquisition of bottom-land hardwoods, and/or purchase of land use easements to preserve existing bottom-land hardwood forest land.

In attempting to mitigate fishery losses, numerous investigations were undertaken to identify structural measures to improve fishery resources. Benefits received from the Muddy Bayou Control Structure, which was completed in 1978, offset all of the project-induced fishery losses. All other mitigation plans involved an attempt to offset remaining terrestrial losses resulting from construction of the project.

The mitigation studies involved computation of mitigation requirements for the proposed Yazoo Area Pump Project as well as the completed Yazoo area levees, connecting channel, and Satartia area levees as a unitary system. This system approach assumes that Congress will authorize mitigation for both the pumps and the levees and that mitigation lands for both will be purchased prior to or in conjunction with construction of the pumping plant. Using this approach, mitigation requirements are computed in two phases. Step I consists of mitigating those woodland losses resulting from project rights-of-way and changes in water regime. Step II consists of mitigating those woodland losses resulting from project-induced clearing on the remaining nondedicated woodlands after Step I requirements have been satisfied. Losses on agricultural lands were analyzed separately from woodland losses and were offset by benefits received from the authorized greentree reservoirs in the Delta National Forest.

Both fee simple acquisition and purchase of land use easements on bottom-land hardwood forest land were evaluated in detail using the approach described above. The mitigation requirements were determined using both the man-day analysis and habitat evaluation procedure (HEP).

Land use easements provide an excellent means of meeting mitigation requirements because of their acceptability to the public, they are less expensive, and easements would preserve more bottom-land hardwoods than fee simple acquisition. These easements will be obtained on land within the immediate project area and will be perpetual easements to restrict any change in land

use from that of mixed hardwood forest. Owners will retain control of access, with the exception that the Corps or other managing agencies may enter for purposes of inspection.

Consideration was given to the possibility of acquiring easements for the project life rather than perpetuity. This option was not recommended for meeting mitigation needs since the majority of the losses associated with the projects would be permanent. For example, the woodlands that were cleared to build the levees and channels resulted in permanent losses to wildlife habitat. Projects of this type are normally operated as long as the need and justification for the project exist. If at some time in the future it is determined that the project is no longer needed, the need for retaining easements on lands acquired for mitigation of project-induced losses could be reevaluated.

Although land use easements were selected as the primary means of meeting mitigation needs, the recommended mitigation plan will not preclude either the fee or easement option of acquisition. The reason stems from the fact that present conditions may change dramatically prior to the time land acquisition is initiated. The proposed mitigation plan will provide the flexibility to acquire mitigation lands by either fee simple purchase or land use easement or some combination of the two. However, when and where appropriate, land use easements will be taken in lieu of fee acquisition.

A separate mitigation report recommending the acquisition of lands for mitigation of the completed Yazoo Backwater Projects and the Yazoo Area Pump Project to be authorized and funded concurrently with project construction has been prepared for submittal to Congress for authorization. This report recommends the acquisition of 40,000 acres in land use easements or the purchase and development of 32,800 acres in bottom-land hardwoods, or some combination of the two. Individual mitigation requirements include 33,500 acres in land use easements or 26,800 acres in fee simple purchase for mitigation of the levees and 6,500 acres in land use easements or 6,000 acres in fee simple purchase for mitigation of the pumps. If the unitary system is not authorized by Congress and the losses resulting from the levees are not mitigated, 11,300 acres of woodlands would have to be preserved through land use easements or 9,200 acres in fee title to mitigate for the Pump Project. This higher acreage requirement results from the fact that the mitigation requirements determined with the unitary system assume the mitigation lands for both the pumps and levees will be acquired concurrently and thus reduce the project area woodlands subject to clearing. If only mitigation lands for the pumps are acquired, then more woodlands remain in the project area which would be subject to clearing, thus increasing the project-induced clearing.

For the purpose of presenting benefit-cost data for the recommended plan, it was assumed that mitigation for the proposed pump project would consist of 6,500 acres in land use easements.

Implementation of the mitigation plan will be contingent upon Congressional authorization. Upon approval of this report the mitigation plan will be forwarded as a separate report through the Chief of Engineers to Congress for authorization. The mitigation lands will be purchased by the Corps prior to

or concurrently with construction of the project. First cost and annual cost for the 6,500 acres of land use easements for mitigation of the Pump Project are estimated at approximately \$2,859,000 and \$100,000, respectively.

## DESCRIPTION OF RECOMMENDED PUMP PLAN

### Pumps

The major feature of the recommended plan is a 17,500-cubic-foot-per-second pumping station located in the lower ponding area approximately 0.8 mile west of the Steele Bayou drainage structure (Plate 2). Pumping would be initiated when interior ponding reaches elevation 80 feet, NGVD, except during the period 1 December-1 March when pumping would be initiated at elevation 85 feet, NGVD. The frequency of flooding below elevation 80 feet, NGVD, would be unchanged. The full pump capacity of 17,500 cubic feet per second will be used only with larger floods. The pumping will be accomplished in increments equivalent to the optimum pump size, which will be determined in the tail design, and increased in like increments. Detailed operational procedures are discussed in Appendix C, Hydrology and Hydraulics (see Figure 1, following the Recommendations Section).

### Inlet and Outlet Channels

The inlet channel will vary in bottom width from 375 feet where it leaves Steele Bayou to a maximum of 785 feet at the pumping plant. It will be approximately 4,000 feet long and will vary in depth from 10 to 30 feet as the lay of the land varies. The outlet channel will be about 6,000 feet long and will vary in bottom width from 785 feet at the pumping plant to 290 feet at its confluence with the Yazoo River (see Figure 2). Depth of the outlet channel will vary from approximately 7 to 22 feet as the lay of the land varies. Both channels are designed with 4 horizontal on 1 vertical side slopes. These dimensions are preliminary and are subject to change during detailed design.

Material excavated from the inlet and outlet channels will be placed outside of wetlands and shaped to make the channels more esthetically pleasing and sound. Where possible, inlet and outlet channels will be constructed to provide a fishery habitat after construction.

### Real Estate Requirements

Perpetual easements will be necessary on approximately 300 acres, 55 acres of which already have easements for levee construction, operation, and maintenance. Fee title acquisition will be required for 40 acres at the structure site, all of which is already under easement for levee construction.

Real estate cost estimates are based on recent aerial photographs and field investigations and include contingencies. Requirements for relocation assistance are not anticipated. Appendix E contains a more detailed estimate of real estate costs and requirements.

### Relocations

The relocations required as a result of this project include one gravel road, two powerlines, and telephone lines (see Plate 3). No betterments are estimated to accrue as a result of these relocations. Adverse effects on the environment of the immediate area will be only minor and of short duration. One state highway bridge will have to be constructed in Highway 465 across the outlet channel.

### Access to Construction Site

The proposed site for the pumping plant is located north of Vicksburg just west of the Steele Bayou drainage structure. The site is about 18 miles from Vicksburg via U. S. Highway 61 and State Highway 465. The Illinois Central Railroad has a major terminal in Vicksburg. This railroad parallels U. S. Highway 61 to Redwood, about 8 miles by road from the site. The site can be reached from State Highway 465. There is access to the site by water transportation on the Yazoo River to within 1 mile of the proposed construction site.

### Construction Materials Sources

The soils data indicate that the materials in the area are suitable for placement in random structural backfill. Material will be obtained from excavation of the inlet and outlet channels when that material is suitable. Fine and coarse aggregates suitable for concrete and filter materials and stone suitable for riprap protection are not available in the immediate vicinity of the work and must be hauled to the site.

### Drainage Structures

The drainage patterns and outlets will continue to function as they do under existing conditions, when not affected by backwater flooding. During backwater flooding, the drainage structures will be closed when river stage exceeds the ponding area stage, and rainfall runoff will be directed to the pumping plant.

### COST ESTIMATE

The cost estimate presented in this report for channel yardage quantities is based on limited field surveys and quadrangle maps. Unit costs of all features are based on prevailing costs and knowledge of similar construction activities in the area. A detailed cost estimate is presented in Appendix E. The first costs of the recommended plan, based on October 1980 price levels, are given in Table 8. The Federal Government will bear 100 percent of the project first costs.

TABLE 8  
FIRST COSTS OF RECOMMENDED PLAN <sup>a/</sup>

Account No. :	Item :	Recommended Plan (\$000)
01	Lands and damages <sup>b/</sup>	3,038
02	Relocations	1,074
09	Channels	4,588
13	Structures (pumping plant)	110,526
30	Engineering and design	17,428
31	Supervision and administration	<u>13,361</u>
	Total Project Cost	150,015

<sup>a/</sup> Based on October 1980 price levels.

<sup>b/</sup> Includes \$2,859,000 for mitigation.

#### OPERATION AND MAINTENANCE

##### General

Local interest responsibility for maintenance of this project will consist of minor maintenance of the inlet and outlet channels. All other operation and maintenance of this feature of the Yazoo Backwater Project will be a Federal cost. Major channel maintenance will be a Federal responsibility. Maintenance of channel vegetation will be performed by the local sponsors using the maintenance methods which are most suitable and cause no damage to the natural environment. The removal of drift racks in the channel at the pumping plant and at bridges will be the responsibility of the owner of those structures.

##### Cost

Estimated annual Federal and non-Federal costs for operation and maintenance of the project (including the pumping plant and inlet and outlet channels) are \$1,020,200 and \$1,200, respectively, for a total annual operation and maintenance cost of \$1,021,400. The recommended mitigation plan will not require any annual operation and maintenance. Operation and maintenance costs would total approximately \$45,000 annually if all mitigation lands were acquired in fee simple purchase.

## LOCAL SPONSOR

The Mississippi Levee District is the project sponsor. Formal assurances have not been requested; however, the Mississippi Levee District has previously furnished assurances of local cooperation for flood control works in the area. The Mississippi Levee District has indicated their total support for Plan C with a 17,500-cfs pump in statements presented at the public meetings and in a resolution adopted 12 January 1981. The Levee District recommends that land use easements for mitigation purposes be acquired for the life of the project only rather than in perpetuity and that lands be acquired in fee simple only where there is a willing seller.

## BENEFIT-COST SUMMARY

Table 9 shows a summary of benefit-cost data for the recommended plan with mitigation. These data are presented for both the authorized discount rate of 2-1/2 percent as well as the current discount rate of 7-5/8 percent. The project is economically justified using either discount rate, with a 3.2 to 1 ratio at 2-1/2 percent and a 1.3 to 1 ratio at 7-5/8 percent.

TABLE 9  
BENEFIT-COST DATA FOR  
RECOMMENDED PLAN WITH MITIGATION

Item	: Authorized Discount : Rate (2-1/2 Percent)	: Current Discount : Rate (7-5/8 Percent)
First Cost	150,000,000	150,000,000
Annual Benefits	21,346,000	19,027,000
Annual Cost	6,633,000	14,950,000
Excess Benefits Over Cost	14,713,000	4,077,000
Benefit-Cost Ratio	3.2	1.3

## DIVISION OF PLAN RESPONSIBILITIES

The purpose of this section is to present pertinent information concerning the Federal and non-Federal responsibilities regarding cost apportionment and the division of responsibilities for construction and subsequent operation and



maintenance of the proposed project. Such cost apportionment is based on Federal legislation and administrative policies.

#### FEDERAL RESPONSIBILITIES

Under existing legislation for the Yazoo Backwater project, construction, operation and maintenance costs for the authorized pump plan would be borne by the Federal Government, except for minor maintenance of the inlet and outlet channels. If a pump plan is selected which exceeds the scope of the authorized plan to the extent that it is no longer within the Chief's discretionary authority, it would then have to be authorized by Congress. Presently, all projects going to Congress for authorization will include cost sharing based on requirements now being developed by the current Administration.

The Federal Government would design, prepare detailed plans and specifications, and construct the project. This would be accomplished after Congressional funding, and after the non-Federal items required prior to construction have been provided. The Federal Government would also be responsible for the relocation and modification of bridges, and would assume responsibility for its contractors during construction.

#### NON-FEDERAL RESPONSIBILITIES

The local sponsoring agencies are required to perform minor maintenance of the inlet and outlet channel for the recommended plan. A listing of the sponsors and their functions is provided in Appendix H.

#### PUBLIC VIEWS AND COORDINATION

Key Federal and state agencies have been kept informed of plan development during the course of the study. An initial coordination meeting was held 26 February 1975 and representatives of the following agencies attended: Mississippi Bureau of Recreation and Parks of the Mississippi Department of Natural Resources, U. S. Forest Service, Environmental Protection Agency, U. S. Fish and Wildlife Service (FWS), Soil Conservation Service, Delta Council, Yazoo-Mississippi Delta Levee District, Mississippi Farm Bureau, and Board of Mississippi Levee Commissioners.

On 5 March 1975, a separate meeting was held with representatives of the Mississippi Department of Wildlife Conservation. Additional contacts have been made with each of these agencies through correspondence during the course of this study. Numerous informal meetings were held with FWS during the study to exchange information and discuss alternatives. Several coordination meetings have been held with the project sponsors, some of which were attended by members of the Mississippi Farm Bureau Federation and the Delta Council, newspaper staffs, and the general public.

A formulation stage public meeting was held in Vicksburg, Mississippi, on 10 July 1979 to present the alternatives developed for the area and solicit public views and comments. Prior to the meeting, a public meeting notice was distributed to over 1,200 people and coverage was provided by the news media. In addition, an information summary of the project was mailed prior to the meeting and distributed to the approximately 500 people present at the public meeting.

Following the public meeting, another information summary explaining the results of the public meeting and the future schedule was mailed to approximately 1,700 people including the news media.



PHOTO 6. Public Meeting, 10 July 1979, attended by approximately 500 people.

In addition to nine resolutions received prior to the public meeting, comments from 293 individuals, plus 6 petitions containing 660 signatures, were received during and after the public meeting. It was determined that the majority of the people (88 percent) favored the building of pumps. Many of the responses concerned the need for project mitigation (defined as any means of relieving, offsetting, or lessening damages to fish and wildlife and the environment caused by Federal water resource projects). The most preferred type of mitigation was land use easements; fee title acquisition from willing sellers was the next most preferred method of mitigation. There was almost total opposition to fee title acquisition of land for mitigation by condemnation.

A final public meeting was held in Rolling Fork, Mississippi, on 6 April 1982 to present the recommended plan to the public. Prior to the meeting, an information summary and public meeting notice was distributed to approximately 1,700 people and coverage was provided by the news media. Approximately 300 people attended the meeting.

Prior to, during, and after the meeting, comments were received from 180 individuals. Of those responding, approximately 94 percent favored the recommended pump plan while only 6 percent opposed the installation of pumps. Of those responding regarding mitigation, approximately 72 percent opposed mitigation. If mitigation is authorized, approximately 78 percent favor easements for the life of the project.

Those attending the final public meeting and supporting implementation of the recommended plan included Honorable William Winter, Governor of Mississippi; Congressman David Bowen; and Mr. C. B. Newman, Speaker of the State House of Representatives. Statements from U. S. Senators Thad Cochran and John C. Stennis and Congressman G. V. Montgomery were read supporting the pump project. A statement was also received from Congressman Trent Lott supporting the recommended pump plan.

Various agencies supporting the project included the Mississippi Levee Board, the Delta Council, and the Mississippi Farm Bureau Federation. Those agencies opposing implementation of the proposed project included U. S. Fish and Wildlife Service, the Environmental Defense Fund, the National Wildlife Federation, and the Mississippi Wildlife Federation.

## **CONCLUSIONS**

The Yazoo Area has major flood problems with existing average annual flood damages of \$3.9 million. The majority of flood damages occur to agricultural development. There are also environmental problems in the area with the increased loss of bottom-land hardwood forest.

The studies described in these report documents have been extensive and thorough. All reasonable alternative solutions to the problems and needs have been evaluated and the plan judged to be in the best overall public interest has been selected. Affected local, state, and Federal agencies have participated in the planning process and plan selection.

The beneficial effects of the proposed plan to local, regional, and national areas outweigh the adverse environmental effects of the project. The recommended action is consonant with national policies, statutes, and administrative directives and conforms to applicable state and local flood plain protection standards.

Mitigation requirements for the proposed flood control plan are presented in a separate fish and wildlife mitigation report which will require Congressional authorization. This report recommends the purchase and development of 32,800 acres of bottom-land hardwoods in fee simple title or the acquisition of 40,000 acres in land use easements or some combination of the two for mitigation of the Yazoo Area Pump Project and the Yazoo Area and Satartia Area Levee Projects. Individual mitigation requirements for the Yazoo Area Pump Project consist of the purchase and development of 6,000 acres in fee simple title, the acquisition of 6,500 acres in land use easements, or some combination of the two.

## **RECOMMENDATIONS**

I recommend that the project plan (Plan C), as described in this report, be approved for construction. The flood control features consist of a 17,500-cubic-foot-per-second pumping plant, with pumping initiated at elevation 80 feet, NGVD, March through November and at 85 feet, NGVD, from 1 December to 1 March, and related inlet and outlet channels. The project mitigation feature consists of the purchase of 6,500 acres of woodlands in land use easements or 6,000 acres in fee simple purchase or some combination of easement and fee, which requires authorization by Congress. The estimated first cost of the project is \$150,000,000 including approximately \$2,859,000 for mitigation. Annual operation and maintenance cost for the project is \$1,021,000.

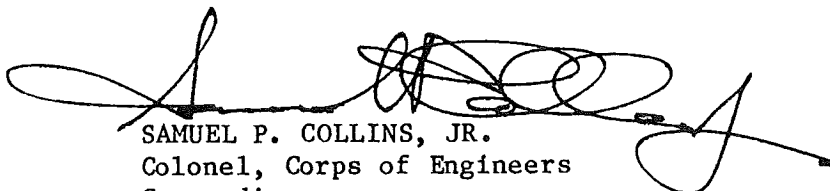
Local interest requirements are as follows:

a. Maintain the levee in accordance with the provisions of Section 3 of the Act of 15 May 1928.

b. Assure levee in the backwater area not be raised above the limiting elevations established by the Chief of Engineers.

c. Hold and save the United States free from damages due to the construction works except damages due to the fault or negligence of the United States or its contractors.

d. Provide minor maintenance of the inlet and outlet channels (cut grass, remove weeds and trash, and perform minor repairs), estimated at \$1,200 annually.



SAMUEL P. COLLINS, JR.  
Colonel, Corps of Engineers  
Commanding

